LETTERS

USING ADJUSTED RELATIVE RISKS TO CALCULATE ATTRIBUTABLE FRACTIONS

Leveille et al.[1] estimated population attributable fraction (PAF) values for arthritis attributable to obesity by using multivariate-adjusted relative risks and the body mass index distribution in the US population aged 40 through 74 years. It is important to adjust relative risk estimates for confounding factors such as age and gender that are associated with both arthritis and obesity. However, when relative risks are adjusted for confounding factors, it is also necessary to use properly adjusted estimators of attributable fraction to avoid bias.

The PAF formula cited by Leveille et al. is appropriate only for use with relative risks that are unadjusted for confounding[2]; the use of adjusted relative risks in this formula is incorrect and could lead to bias.[3–5] There are ways to produce attributable fraction estimates that are properly adjusted for confounding and effect modification.[3,4] In addition, Leveille et al. used the method of Zhang and Yu[6] to calculate a relative risk estimate from a multivariate-adjusted odds ratio. This method is not valid when the estimated odds ratio is adjusted for confounding factors.[7]

Leveille et al. compared risk estimates and PAF values over time from the series of National Health and Nutrition Examination Surveys (NHANES), but without confidence intervals or statistical tests. Methods for statistical inference using data from multiple cross-sectional surveys are available.[8] A recent article provides a method of calculating standard errors for attributable fractions from surveys with complex sample designs such as that of the NHANES.[9] ■

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doi:10.2105/AJPH.2005.079731

References

1. Leveille SG, Wee CC, Iezzoni LI. Trends in obesity and arthritis among baby boomers and their predecessors, 1971–2002. *Am J Public Health.* 2005;95:1607–1613.

2. Kleinbaum DG, Kupper LL, Morgenstern H. *Epidemiologic Research: Principles and Quantitative Methods.* Belmont, Calif: Lifetime Learning Publications; 1982.

3. Rockhill B, Newman B, Weinberg C. Use and misuse of population attributable fractions. *Am J Public Health.* 1998;88:15–19.

4. Benichou J. A review of adjusted estimators of attributable risk. *Stat Methods Med Res.* 2001;10:195–216.

5. Flegal KM, Graubard BI, Williamson DF. Methods of calculating deaths attributable to obesity. *Am J Epidemiol.* 2004;160:331–338.

6. Zhang J, Yu KF. What's the relative risk? A method of correcting the odds ratio in cohort studies of common outcomes. *JAMA.* 1998;280:1690–1691.

7. McNutt LA, Wu C, Xue X, Hafner JP. Estimating the relative risk in cohort studies and clinical trials of common outcomes. *Am J Epidemiol.* 2003;157:940–943.

8. Korn EL, Graubard BI. *Analysis of Health Surveys.* New York, NY: John Wiley & Sons Inc; 1999.

9. Graubard BI, Fears TR. Standard errors for attributable risk for simple and complex sample designs. *Biometrics.* 2005;61:847–855.

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